CLAIMS:

1. An apparatus suitable for use in reciprocally moving a valve, comprising:

a camshaft comprising at least a first cam having a first cam lobe defining a first amount of valve opening and a second cam having a second cam lobe defining a second amount of valve opening, the first amount of valve opening being different from the second amount of valve opening,

a mounting pin,

a cam follower defined on the mounting pin and being arranged and constructed to provide:

a first rotational position relative to the camshaft at which the cam follower is arranged and constructed to operatively engage the first cam and to not engage the second cam, whereby the first amount of valve opening is generated, and

a second rotational position relative to the camshaft at which the cam follower is arranged and constructed to operatively engage the second cam and to not engage the first cam, whereby the second amount of valve opening is generated,

a valve lever rotatably supporting the mounting pin and being adapted to transmit the respective generated first and second amounts of valve opening to the valve, and

a locking device arranged and constructed to releasably lock the cam follower in the respective first and second rotational positions and being further arranged and constructed to permit rotation of the cam follower when the mounting pin is not locked.

2. An apparatus as in claim 1, wherein the first cam defines a full valve-lift cam and the second cam defines a partial valve lift cam, the mounting pin includes at least one full valve lift mounting portion and at least one partial valve lift mounting portion, the full valve lift mounting portion and the partial valve lift portion being arranged eccentrically with respect to a rotational axis of the mounting pin in an angularly displaced relationship, and the mounting pin further comprising at least one full valve lift cam roller mounted on the at least one full valve lift mounting portion and at least one partial valve lift cam roller mounted on the at least one partial valve lift mounting portion.

3. An apparatus as in claim 2, wherein the camshaft comprises an arrangement selected from the group consisting of (a) two first cams disposed on opposite sides of one second cam and (b) two second cams disposed on opposite sides of one first cam.

4. An apparatus as in claim 3, further comprising a first friction disk non-rotatably attached to the mounting pin, wherein at least a portion of an outer peripheral surface of the first friction disk is arranged and constructed to frictionally contact a peripheral surface of the camshaft so as to cause the mounting pin to rotate when the first friction disk contacts the camshaft and the mounting pin is not locked by the locking device.

5. An apparatus as in claim 4, wherein the outer peripheral surface of the first friction disk comprises at least one flattened portion disposed at a location that will face the camshaft when the mounting pin is disposed in the first rotational position.

6. An apparatus as in claim 5, wherein the locking device is arranged and constructed to releasably engage and lock the first friction disk in the first rotational position.

7. An apparatus as in claim 6, wherein the mounting pin is rotatably disposed across the valve lever, the first friction disk is fixedly attached substantially at a first terminal end of the mounting pin and a second friction disk is fixedly attached substantially at a second terminal end of the mounting pin.

8. An apparatus as in claim 7, wherein the locking device comprises a locking pin reciprocally, slidably disposed in at least one aperture defined within the valve lever, the locking pin extending substantially parallel to the mounting pin and being axially displaceable relative to the mounting pin, wherein a first terminal end of the locking pin is arranged and constructed to a releasably engage and lock the first friction disk, thereby preventing rotation of the first friction disk in a first axial position of the locking pin relative to the mounting pin, and a second terminal end of the locking pin is arranged and constructed to releasably engage and lock the second friction disk, thereby

preventing rotation of the second friction disk in a second axial position of the locking pin relative to the mounting pin.

9. An apparatus as in claim 8, wherein a first recess is defined within the first friction disk, the first recess being arranged and constructed to releasably engage the first terminal end of the locking pin, and a second recess is defined within the second friction disk, the second recess being arranged and constructed to releaseably engage the second terminal end of the locking pin, and wherein the first recess is rotationally displaced relative to the second recess by 180°.

10. An apparatus as in claim 9, wherein the locking pin comprises a piston, a shank extending from the piston and a cover coupled to the shaft, further comprising:

a sleeve disposed within the aperture of the valve lever, the locking pin being slidably disposed within the sleeve,

a compression spring biasing the locking pin in a first axial direction and

a pressure chamber defined within the sleeve, the pressure chamber being arranged and constructed such that increased fluid pressure within the pressure chamber urges the locking pin in a second axial direction that is opposite of the first axial direction.

11. An apparatus as in claim 10, wherein a first eccentric portion defined on the first mounting portion is displaced by 180° from a second eccentric portion defined on the second mounting portion with respect to the rotational axis of the mounting pin.

12. An apparatus as in claim 11, wherein the valve lever comprises at least one follower projection defined to provide a third lockable rotational position, at which the cam follower does not operatively engage the first or second cams, the at least one follower projection being arranged and constructed to press against a raised peripheral surface of the camshaft in the third lockable rotational position, thereby causing the valve lever to maintain the valve in the valve closed position while the camshaft is rotating.

13. An apparatus as in claim 1, wherein the camshaft comprises an arrangement selected from the group consisting of (a) two first cams disposed on opposite sides of one second cam and (b) two second cams disposed on opposite sides of one first cam.

14. An apparatus as in claim 1, further comprising a first friction disk non-rotatably attached to the mounting pin, wherein at least a portion of an outer peripheral surface of the first friction disk is arranged and constructed to frictionally contact a peripheral surface of the camshaft so as to cause the mounting pin to rotate when the first friction disk contacts the camshaft and the mounting pin is not locked by the locking device.

15. An apparatus as in claim 14, wherein the outer peripheral surface of the first friction disk comprises at least one flattened portion disposed at a location that will face the camshaft when the mounting pin is disposed in the first rotational position.

16. An apparatus as in claim 15, wherein the locking device is arranged and constructed to releasably engage and lock the first friction disk in the first rotational position.

17. An apparatus as in claim 16, wherein the mounting pin is rotatably disposed across the valve lever, the first friction disk is fixedly attached substantially at a first terminal end of the mounting pin and a second friction disk is fixedly attached substantially at a second terminal end of the mounting pin.

18. An apparatus as in claim 1, wherein the locking device comprises a locking pin reciprocally, slidably disposed in at least one aperture defined within the valve lever, the locking pin extending substantially parallel to the mounting pin and being axially displaceable relative to the mounting pin, wherein a first terminal end of the locking pin is arranged and constructed to a releasably engage and lock a first friction disk disposed on the mounting pin, thereby preventing rotation of the first friction disk in a first axial position of the locking pin relative to the mounting pin, and a second terminal end of the locking pin is arranged and constructed to releasably engage and lock a second friction

disk disposed on the mounting pin, thereby preventing rotation of the second friction disk in a second axial position of the locking pin relative to the mounting pin.

19. An apparatus as in claim 18, wherein a first recess is defined within the first friction disk, the first recess being arranged and constructed to releasably engage the first terminal end of the locking pin, and a second recess is defined within the second friction disk, the second recess being arranged and constructed to releaseably engage the second terminal end of the locking pin, and wherein the first recess is rotationally displaced relative to the second recess by 180^{o}.

20. An apparatus as in claim 18, wherein the locking pin comprises a piston, a shank extending from the piston and a cover coupled to the shaft, further comprising:

a sleeve disposed within the aperture of the valve lever, the locking pin being slidably disposed within the sleeve,

a compression spring biasing the locking pin in a first axial direction and

a pressure chamber defined within the sleeve, the pressure chamber being arranged and constructed such that increased fluid pressure within the pressure chamber urges the locking pin in a second axial direction that is opposite of the first axial direction.

21. An apparatus as in claim 1, wherein a first eccentric portion defined on the first mounting portion is displaced by 180^{o} from a second eccentric portion defined on the second mounting portion with respect to a rotational axis of the mounting pin.

22. An apparatus as in claim 1, wherein the valve lever comprises at least one follower projection defined to provide a third lockable rotational position, at which the cam follower does not operatively engage the first or second cams, the at least one follower projection being arranged and constructed to press against a raised peripheral surface of the camshaft in the third lockable rotational position, thereby causing the valve lever to maintain the valve in the valve closed position while the camshaft is rotating.

23. An apparatus for opening and closing a valve, comprising:

rotating means (i) for rotating a cam follower to a first rotational position, at which a first eccentric bearing surface defined on the cam follower operably engages a first cam defined on a rotating camshaft, wherein the operable engagement of the first eccentric bearing surface and the rotating first cam defines a first range of valve opening distance from a valve closed position, and (ii) for rotating the cam follower to a second rotational position, at which a second eccentric bearing surface defined on the cam follower operably engages a second cam defined on the rotating camshaft, wherein the operable engagement of the second eccentric bearing surface and the rotating second cam defines a second range of valve opening distance from the valve closed position,

means for releasably locking the cam follower in (i) the first rotational position and (ii) the second rotational position, and

means for transmitting (i) the first range of valve opening distance to the valve, such that the valve is reciprocally moved between the valve closed position and a valve fully opened position, and (ii) the second range of valve opening distance to the valve, such that the valve is reciprocally moved between the valve closed position and an intermediate valve open position, the intermediate valve open position being defined between the valve closed position and the valve fully opened position.

24. A method for opening and closing a valve, comprising:

rotating a cam follower to a first rotational position, at which a first eccentric bearing surface defined on the cam follower operably engages a first cam defined on a rotating camshaft, wherein the operable engagement of the first eccentric bearing surface and the rotating first cam defines a first range of valve opening distance from a valve closed position,

releasably locking the cam follower in the first rotational position,

transmitting the first range of valve opening distance to the valve, thereby reciprocally moving the valve between the valve closed position and a valve fully opened position,

rotating the cam follower to a second rotational position, at which a second eccentric bearing surface defined on the cam follower operably engages a second cam

defined on the rotating camshaft, wherein the operable engagement of the second eccentric bearing surface and the rotating second cam defines a second range of valve opening distance from the valve closed position,

releasably locking the cam follower in the second rotational position, and

transmitting the second range of valve opening distance to the valve, thereby reciprocally moving the valve between the valve closed position and an intermediate valve open position, the intermediate valve open position being defined between the valve closed position and the valve fully opened position.

25. A method as in claim 24, further comprising:

rotating the cam follower to a third rotational position, at which a third eccentric bearing surface defined on the cam follower operably engages a third cam defined on the rotating camshaft, wherein the operable engagement of the third eccentric bearing surface and the rotating third cam defines a third range of valve opening distance from the valve closed position,

releasably locking the cam follower in the third rotational position, and

transmitting the third range of valve opening distance to the valve, thereby reciprocally moving the valve between the valve closed position and a second intermediate valve open position, the second intermediate valve open position being defined between the valve closed position and the intermediate valve open position.